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(54) **SPOOL GUN HAVING UNITARY SHIELDING GAS AND WELD POWER CONNECTOR**

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See application file for complete search history.

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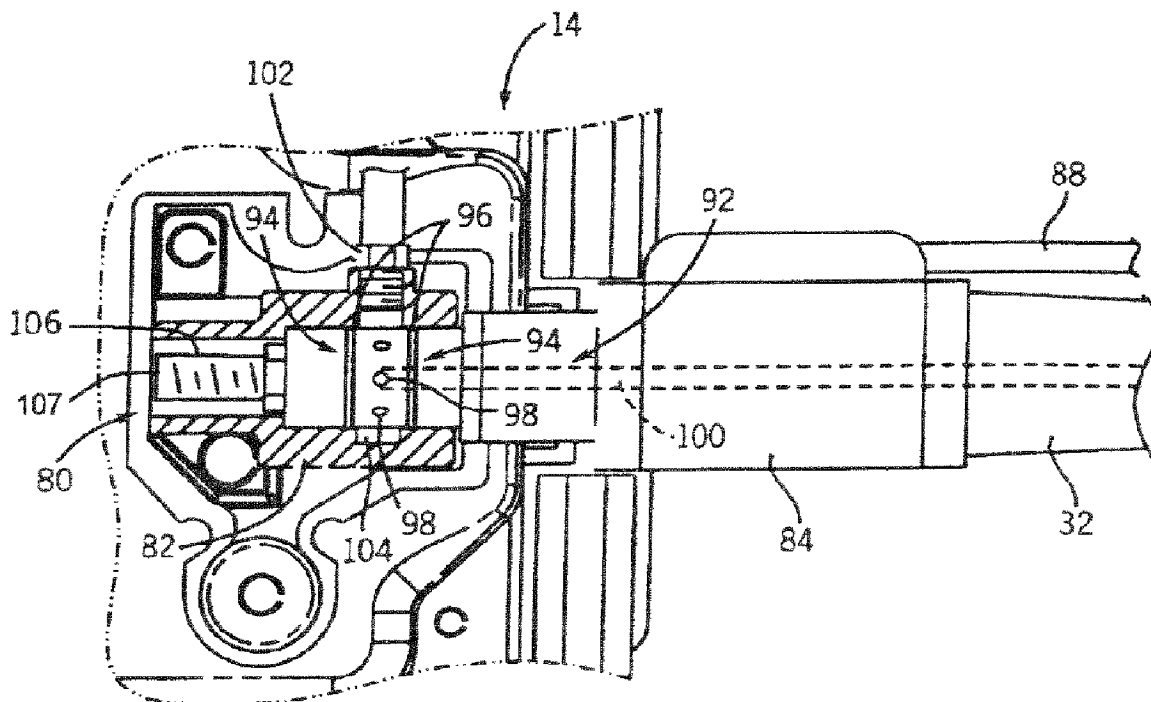
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(57) **ABSTRACT**

A spool gun having a quick connector connectable to an electrical power source and a gas source is disclosed. A connection line extends from the spool gun and is attached to a connector. The connector both fluidly connects the spool gun to a shielding gas source and electrically connects the spool gun to a power source constructed to generate a welding-type power. Such a spool gun is quickly and efficiently connectable to the gas and power systems required for performing welding processes.

19 Claims, 3 Drawing Sheets



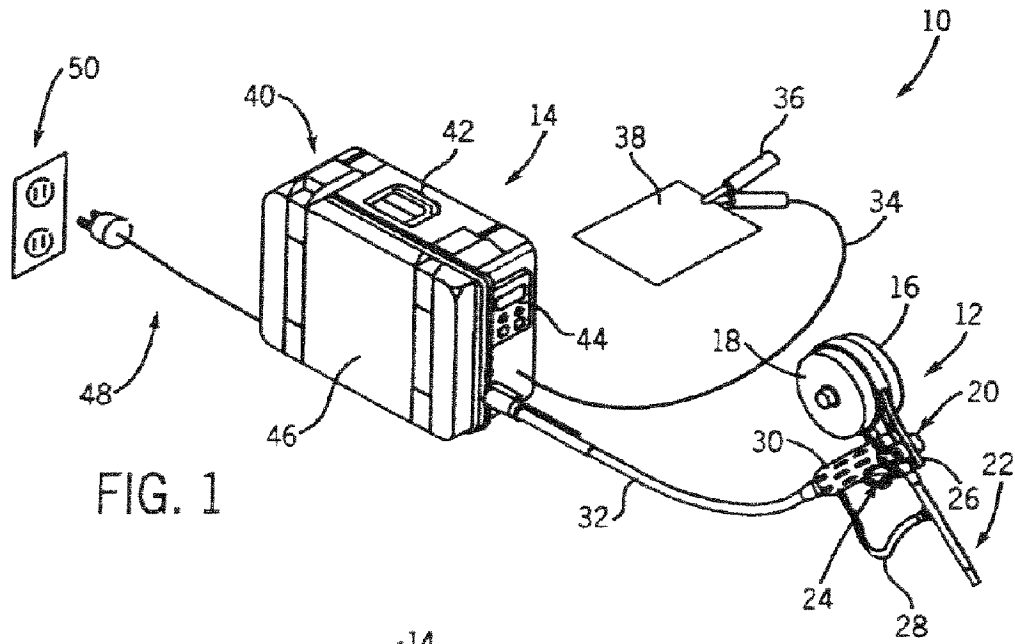


FIG. 1

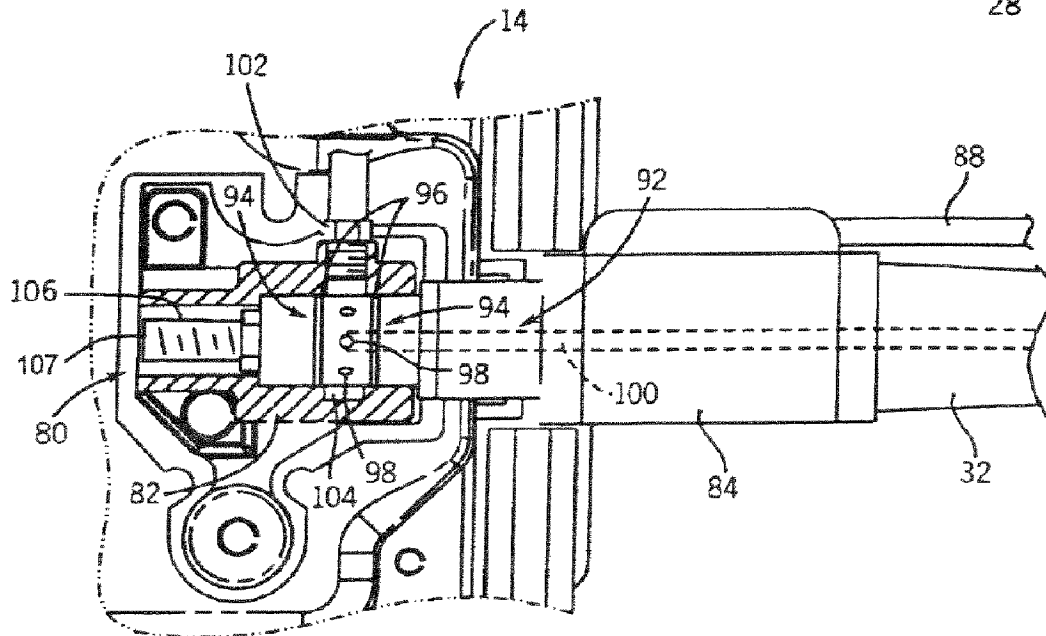
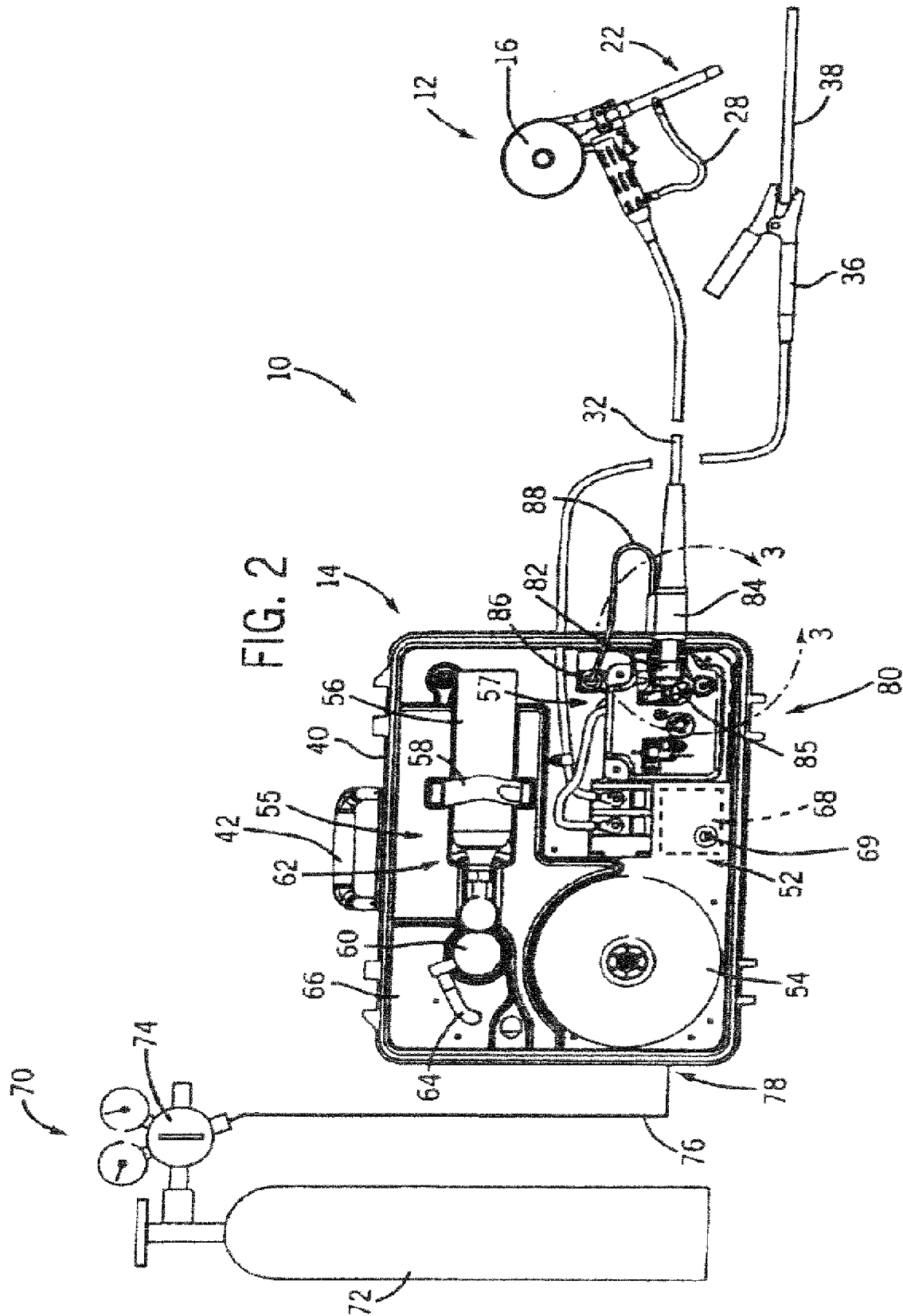
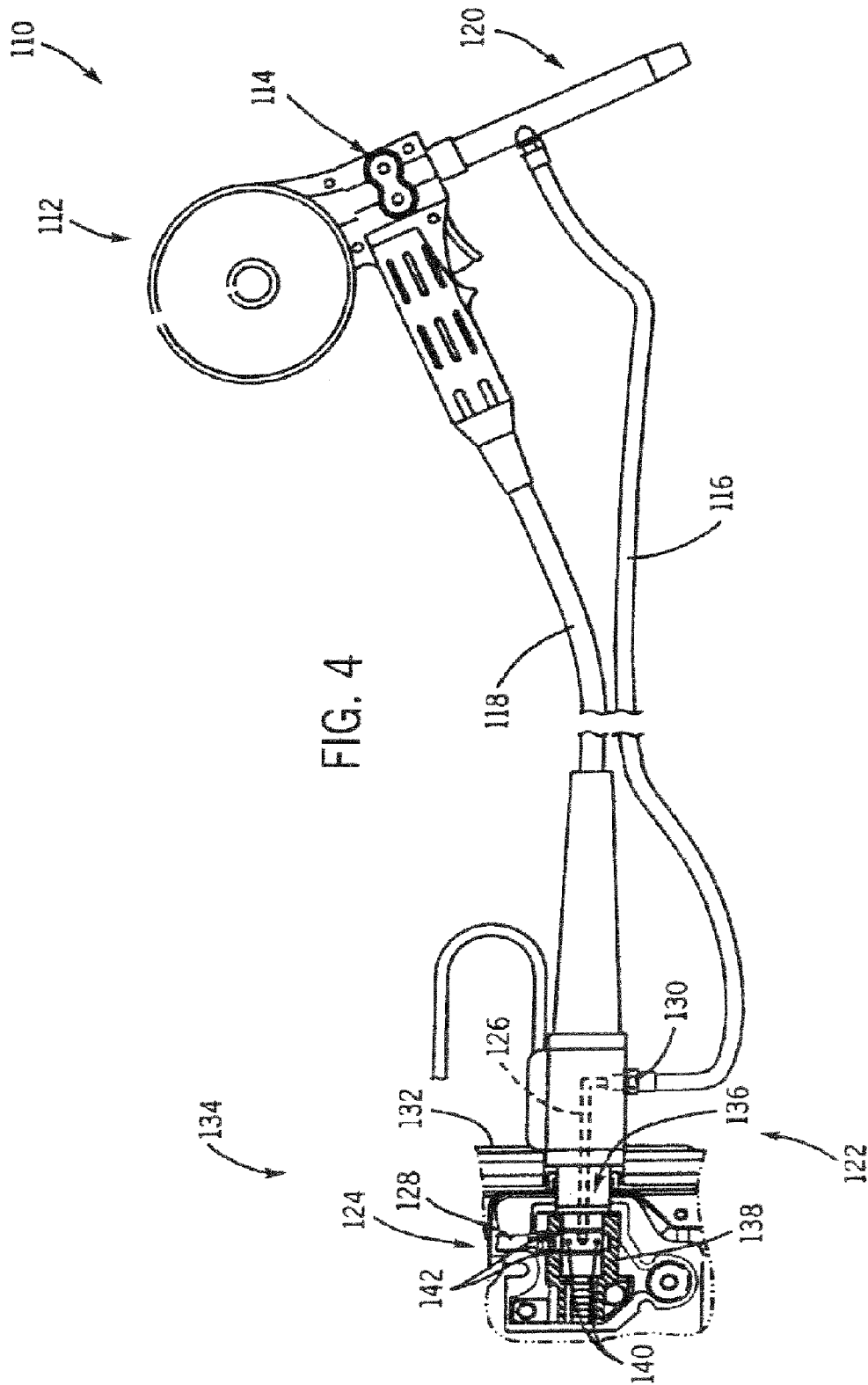


FIG. 3





SPOOL GUN HAVING UNITARY SHIELDING GAS AND WELD POWER CONNECTOR

BACKGROUND OF THE INVENTION

The present invention relates generally to welding-type devices and, more particularly, to a connector for a spool gun to communicate both electrical power and shielding gas to the spool gun.

Welding-type systems generally include a power source constructed to generate a welding-type power. The welding-type power is communicated to a torch or a gun via a weld cable that extends between the torch and the power source. Some systems contain a consumable weld wire that is fed to the torch. The consumable weld wire can be pushed or pulled using a single motor wire feeder, or can be push/pulled by a dual motor wire feeder from or near the power source to the torch. During the welding process, the consumable weld wire is delivered from the torch to a weld pool.

Some other systems include a spool mounted directly on the weld torch to supply the consumable weld wire to the weld. Such "spool guns" include a supply of consumable weld wire and a wire feeder assembly supported on the torch. By positioning the source of consumable weld wire and the wire feed assembly on the torch, allows one power source to be used for multiple applications, allows for easier transport, and reduces the size of the overall systems. Additionally, the use of a spool gun also enables the use of consumable weld wires that cannot physically support being pushed or pulled from the power source to the torch. That is, some consumable weld wires cannot support the stresses associated with being pushed and/or pulled from the power source to the torch. Therefore, a spool mounted gun allows the use of lighter gauge and/or less rigid consumable weld wires, such as aluminum based wire.

The spool gun torch not only must be electrically connected to a power source, it also requires a shielding gas connection. The electrical connection is often made by a stud and fastener connection of a weld cable to an appropriate terminal of a power source. Such connections usually require a tool, such as a wrench, to loosen and tighten the fasteners associated with the connection.

In addition to electrically connecting the spool gun to a source of welding-type power, the spool gun must also be fluidly connected to a source of shielding gas. The shielding gas connection often requires another tool to tighten/loosen associated threaded components. The gas connection is generally separate and distinct from the electrical connection of the spool gun with the power source. As such, an operator desiring to perform a welding process with a spool gun must complete two separate connections—the shielding gas system connection and the weld-power electrical connection, each requiring a tool to remove and secure the connections. Accordingly, the operator must also locate or have on hand the necessary tools required to complete the connection/disconnection processes. Accordingly, connecting a spool gun to a weld-type power and a shielding gas source is time consuming and detrimentally affects process efficiency.

It would therefore be desirable to have an assembly and welding-type system capable of quickly and efficiently toollessly connecting a spool gun to electrical power and shielding gas.

BRIEF DESCRIPTION OF THE INVENTION

The present invention provides a spool gun assembly and welding-type system and that solves the aforementioned problems. The spool gun includes a connector that connects the spool gun to a shielding gas source and an electrical power source without the use of tools.

Therefore, in accordance with one aspect of the present invention, a torch for welding-type systems is disclosed. The torch includes a spool gun constructed to receive a spool of consumable wire and is connected to a gas supply hose and an electrical supply cable. The torch includes a single connector connectable to both a source of gas and a source of electrical power and is connected to the gas supply hose and the electrical supply cable to deliver gas and electrical power to the spool gun.

According to another aspect of the present invention, a welding system having a power source constructed to generate a power signal suitable for welding-type operations is disclosed. The welding system includes a gas supply constructed to provide a shielding gas to a weld. The system also includes a torch having a supply of consumable weld wire supported thereon and a quick connector. The quick connector is constructed to connect the torch to both the power source and the gas supply.

According to a further aspect of the present invention, a spool gun assembly is disclosed that includes a spool gun handle having a tip at one end, a gas path therethrough, and a power cable attached to a second end. The gun includes a drum thereon to hold a spool of wire. A weld wire drive assembly is attached to the spool gun handle and is constructed to deliver a consumable weld wire from the spool of wire to a tip of the spool gun assembly. The assembly includes a unitary means for connecting both the gas path to a gas system and the power cable to a power source to deliver welding-type power and shielding gas to the tip of the spool gun assembly.

Various other features and advantages of the present invention will be made apparent from the following detailed description and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings illustrate preferred embodiments presently contemplated for carrying out the invention.

In the drawings:

FIG. 1 is a perspective view of a spool gun connected to a welding system according to one embodiment of the present invention.

FIG. 2 is an elevational view of the welding system shown in FIG. 1 with a cover removed from the power source of the welding system and an optional bulk shielding gas source fluidly connected to the power source.

FIG. 3 is a detailed view of the connection between the spool gun and the power source taken along line 3—3 of FIG. 2.

FIG. 4 is an alternate embodiment of the spool gun shown in FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a welding-type system 10 having a spool gun 12 connected to a power source 14. Spool gun 12 has a drum 16 with a removable cover 18 attached thereto. Drum 16 is constructed to receive and dispense a supply of a consumable weld wire therein. Spool gun 12 includes a wire

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feeder drive assembly 20 constructed to feed the consumable weld wire from drum 16 to a tip 22 of spool gun 12 upon actuation of a trigger 24 of spool gun 12. Depression of trigger 24 initiates movement of a feed roller 26 of drive assembly 20. Feed roller 26 is in contact with the consumable weld wire such that rotation of feed roller 26 results in consumable weld wire being delivered to tip 22 of spool gun 12.

A shielding gas is also delivered to tip 22 of spool gun 12 during actuation of trigger 24. A gas hose 28 extends from a handle portion or body 30 of spool gun 12 to tip 22. Alternatively, it is understood that gas hose 28 could be a passage formed internally to body 30 of spool gun 12. Gas hose 28 fluidly connects tip 22 of spool gun 12 to a connection line 32 of spool gun 12. Connection line 32 of spool gun 12 communicates a shielding gas and welding-type electrical power from power source 14 to spool gun 12.

Power source 14 also has a grounding cable 34 extending therefrom. Cable 34 has a work clamp 36 attached thereto wherein the work clamp is constructed to securely engage a workpiece 38. When trigger 24 of spool gun 12 is depressed, consumable weld wire is delivered from tip 22 of spool gun 12. With trigger 24 depressed, as tip 22 is moved toward workpiece 38, an arc is eventually generated between the consumable weld wire and the workpiece and a welding-type process is achieved.

Power source 14 has a housing 40 with a handle 42 positioned about the internal components of the power source. A control panel 44 allows an operator to control the power source when a cover 46 of housing 40 is located in a closed position as shown in FIG. 1. A power cord 48 extends from power source 14 and is constructed to engage an outlet 50 such that power source 14 is powered by a utility grid or the like. Alternatively, it is understood that power source 14 could be powered by a generator internal or external to housing 40. Understandably, the generator could also be powered by an internal combustion engine or the like thereby providing an untethered power source configured to generate power signals suitable to welding-type applications.

FIG. 2 shows welding-type system 10 with the cover of housing 40 removed from power source 14 exposing the internal components 52 thereof. As shown, power source 14 is not limited to use with spool gun 12. In the particular embodiment shown, power source 14 is constructed to include a consumable weld wire 54 fed via a wire feeder 57. However, since spool gun 12 has its own supply of wire 16, consumable weld wire 54 is not delivered to spool gun 12. As such, power source 14 is constructed to be used with multiple different welding-type guns thereby providing a highly versatile welding-type power source. Alternatively, spool gun 12 is constructed for use with various power sources, such as those not containing internal weld wire 54.

Power source 14 has a first gas system 55 which includes a pressure vessel 56 secured in power source 14 by a strap 58. Pressure vessel 56 is constructed to supply shielding gas to spool gun 12. A regulator 60 is connected to an end 62 of pressure vessel 56 such that when pressure vessel 56 is connected to power source 14, shielding gas is delivered to regulator 60 from pressure vessel 56. A hose 64 extends from regulator 60 and passes behind a shroud 66 of power source 14. Hose 64 fluidly connects regulator 60 to a valve 68, shown in phantom, connected to a selector switch 69. Valve 68 is also fluidly connected to an optional second gas system 70.

Optional second gas system 70 includes a bulk gas cylinder 72 and a bulk regulator 74 connected thereto. A

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hose 76 extends between power source 14 and bulk regulator 74 and removeably connects second gas system 70 to power source 14 at connection 78. Connection 78 fluidly communicates shielding gas from second gas system 70 to valve 68 having selector switch 69 such that an operator can select between first gas system 55 and second gas system 70. Such a construction allows power source 14 to be provided with shielding gas from a bulk cylinder when less mobility of the power source is required than when shielding gas is provided from pressure vessel 56. When second gas system 70 is disconnected from power source 14, first gas system 55 provides a lightweight and highly transportable source of shielding gas supported by power source 14. Handle 42 provides for single-handed transportation of the gas system equipped power source 14.

Valve 68 is fluidly connected to a clamp, or weld cable port 80 of power source 14. Weld cable port 80 includes a receptacle 82 constructed to receive a connector 84 of spool gun 12. Weld cable port 80 is constructed to attach connection line 32 of spool gun 12 to both a welding-type electrical power signal and a supply of weld shielding gas. Power source 14 includes a securing screw 85 having a T-handle shape and constructed to engage connector 84 and secure connection line 32 of spool gun 12 to weld cable port 82 without the use of tools. Alternatively, it is understood connector 84 of spool gun 12 could be constructed in a quick connectable manner such that connector 84 could be connected and removed from power source 14 through manipulation of the connector relative to the associated weld cable port without the use of additional clamping screws or the like. Once securely attached to power source 14, connection line 32 of spool gun 12 communicates weld power and shielding gas from power source 14 to spool gun 12 through connector 84.

Connector 84 of spool gun 12 includes a multi-pin control connector 86 connectable to power source 14. Multi-pin connector 86 extends from connector 84 via a cable 88 and identifies the type of torch connected to power source 14 and supplies feedback control signals. Accordingly, when spool gun 12 is connected to power source 14, wire feeder 57 is disabled from supplying consumable weld wire 54 from power source 14 to a torch.

The engagement between connector 84 and receptacle 82 of weld cable port 80 is shown in greater detail in FIG. 3. As shown in FIG. 3, connector 84 includes a shank 92 extending therefrom. Shank 92 is constructed of a conductive material and communicates a welding-type power from power source 14 through connection line 32 to the spool gun. Connector 84 has a pair of grooves 94 formed therein with an O-ring 96 positioned in each of the grooves to form a seal therebetween. A plurality of orifices 98, or gas openings, are formed radially through shank 92 and are in fluid communication with a gas passage 100 formed through connector 84 and connection line 32 of the spool gun.

Receptacle 82 of weld cable port 80 is constructed to snugly receive shank 92 of connector 84 therein. A shielding gas port 102 is formed in receptacle 82 and is fluidly connected to valve 68 shown in FIG. 2. A channel 104 is formed in receptacle 82 generally aligned with shielding gas port 102. When connector 84 is fully inserted into receptacle 82 of weld cable port 80, O-rings 96 generally flank channel 104 and sealingly engage receptacle 82 such that shielding gas introduced into channel 104 flows through orifices 98 and into gas passage 100. Accordingly, connector 84 communicates both shielding gas and welding-type power from power source 14 through connection line 32 to the spool gun.

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It is understood and within the scope of the claims that the engagement between connector **84** and receptacle **82** could be of many specific constructions other than recited above. For example, receptacle **82** could be constructed to threadingly engage an optional threaded portion **106** of connector **84**. Threaded portion **106** could be located at an end **107** of connector **84** or located remotely therefrom. Because no consumable weld wire or shielding gas is passed through end **107** of the connector, end **107** could have a closed construction. Opposite threaded portion **106** would be a single O-ring and an orifice could be positioned therebetween. Positioning the orifice between threaded portion **106** and the single O-ring forms an alternate connector that is quickly and efficiently connectable to a welding-type power source and constructed to communicate both shielding gas and welding-type power to a torch connected to the power source.

A spool gun equipped according to the present invention is quickly and conveniently connectable to a source of shielding gas and a source of welding-type power through a unitary connector. That is, rather than making a first connection to a source of shielding gas and a second connection with a source of electrical power, the spool gun according to the present invention only requires one connection to form a completely operable, shielding gas equipped, spool gun operating welding system. Additionally, a spool gun equipped according to the present invention improves operator maneuverability of the spool gun by having both the welding-type power cable and the shielding gas supply line integrated into a single connection line such that multiple gas/power lines are not positioned across a work area. Alternatively, it is understood there may be instances when it is desirable to have a shielding gas line at least partially independent from a welding-type power cable.

FIG. 4 shows an alternate embodiment of the present invention. As shown in FIG. 4, a spool gun **110** includes a spool of consumable weld wire **112** and a wire feed assembly **114**. Spool gun **110** is substantially similar to spool gun **12** shown in FIG. 1 however, spool gun **110** has a gas line **116** and an electrical weld power cable **118** generally separate from each other. As shown in FIG. 4, gas line **116** extends between a tip **120** of spool gun **110** and a connector **122**. Connector **122** engages weld cable port **124** similar to connector **84** of spool gun **12** shown in FIG. 2. A gas passage **126** passes through connector **122** and fluidly connects a gas supply **128** of weld cable port **124** to a gas port **130** of connector **122**. Gas port **130** is external to a housing **132** of a welding-type power source **134** such that gas line **116** is removably attachable to connector **122** of spool gun **110**. Accordingly, gas line **116** can be connected to alternate gas sources aside from gas supply **128**.

Weld power cable **118** electrically connects spool gun **112** to power source **134** via connector **122**. A shank **136** of connector **122** slidably engages a receptacle **138** of power source **134** and electrically connects weld power cable **118** to power source **134**. A plurality of orifices **140** pass through shank **136** and fluidly communicate shielding gas from gas supply **128** to gas passage **126**. A pair of O-rings **142** flank orifices **140** and prevent gas from passing beyond receptacle **138** other than through gas passage **126**. Connector **122** fluidly connects spool gun **110** to a shielding gas source and electrically connects spool gun **110** to a welding-type power signal.

As one skilled in the art will fully appreciate the heretofore description of welding devices and reference to welding power, welding-type power, or welders generally, includes welding, cutting, or heating power. Description of a welding

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apparatus illustrates just one embodiment in which the present invention may be implemented.

Therefore, one embodiment of the present invention includes a torch for welding-type systems including a spool gun. The spool gun is constructed to receive a spool of consumable wire and is connected to a gas supply hose and an electrical supply cable. The torch includes a single connector connectable to both a source of gas and a source of electrical power and is connected to the gas supply hose and the electrical supply cable to deliver gas and electrical power to the spool gun.

Another embodiment of the present invention includes a welding system having a power source constructed to generate a power signal suitable for welding-type operations. The welding system includes a gas supply constructed to provide a shielding gas to a weld, a torch having a supply of consumable weld wire supported thereon, and a quick connector. The quick connector is constructed to connect the torch to both the power source and the gas supply.

A further embodiment of the present invention includes a spool gun assembly that includes a spool gun handle having a tip at one end, a gas path therethrough, and a power cable attached to a second end. The spool gun includes a drum thereon to hold a spool of wire. A weld wire drive assembly is attached to the spool gun handle and is constructed to deliver a consumable weld wire from the spool of wire to a tip of the spool gun assembly. The assembly includes a unitary means for connecting both the gas path to a gas system and the power cable to a power source to deliver welding-type power and shielding gas to the tip of the spool gun assembly.

The present invention has been described in terms of the preferred embodiment, and it is recognized that equivalents, alternatives, and modifications, aside from those expressly stated, are possible and within the scope of the appending claims.

What is claimed is:

1. A torch for welding-type systems comprising:
 - a spool gun constructed to receive a spool of consumable wire and connected to a gas supply hose and an electrical supply cable;
 - a single connector connectable to both a source of gas and a source of electrical power, the single connector connected to the gas supply hose and the electrical supply cable to deliver gas and electrical power to the spool gun; and
 - wherein the single connector has an outer periphery and an inner passage, the outer periphery having a pair of grooves formed therein that generally flank at least one gas opening formed in the outer periphery that is constructed to allow passage of gas to the inner passage of the connector.
2. The torch of claim 1 further comprising a pair of O-rings, wherein one O-ring is positioned in each groove of the pair of grooves.
3. The torch of claim 1 further comprising a drive assembly attached to the spool gun and constructed to deliver a consumable weld wire from the spool of consumable weld wire to a weld during a welding operation.
4. The torch of claim 3 further comprising a trigger attached to the spool gun and operatively connected to the drive assembly.
5. The torch of claim 1 wherein the single connector is constructed to be connected to a power source configured to generate a welding-type power without use of tools.
6. The torch of claim 1 wherein the single connector has a closed end and an outer periphery, at least one groove

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formed in the outer periphery remote from the closed end and constructed to receive an O-ring therein.

7. The torch of claim 5 wherein the connector is constructed to engage a clamp of the power source, the clamp having a T-handle actuator directly operable by a user.

8. A welding system comprising:
a power source constructed to generate a power signal suitable for welding-type operations;
a gas supply constructed to provide a shielding gas to a weld;
a torch having a supply of consumable weld wire supported thereon;
a quick connector constructed to connect the torch to both the power source and the gas supply; and

wherein the quick connector has a threading formed thereabout and a seal and a gas passage formed through the quick connector between the threading and the seal.

9. The welding system of claim 8 wherein the gas supply includes a first gas supply and a second gas supply wherein the first gas supply and the second gas supply are fluidly connected to a valve, the valve constructed to operatively connect the quick connector to only one of the first gas supply and the second gas supply.

10. The welding system of claim 8 wherein the quick connector further comprises a passage therethrough, the passage constructed to fluidly connect the torch and the gas supply.

11. The welding system of claim 8 further comprising a drive mechanism attached to the torch and constructed to deliver the supply of consumable weld wire to a weld.

12. The welding system of claim 8 wherein the quick connector is toollessly electrically connectable to the power source and fluidly connectable to the gas supply.

13. The welding system of claim 8 wherein the supply of consumable weld wire is further defined as a spool of consumable weld wire and the spool of consumable weld wire is supported on a hub attached to the torch.

14. The welding system of claim 8 further comprising a seal assembly constructed to fluidly seal an engagement between the quick connector and the gas supply.

15. A spool gun assembly comprising:
a spool gun handle having a tip at one end, a gas path therethrough, and a power cable attached to a second end;

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a drum on the spool gun to hold a spool of wire;
a weld wire drive assembly attached to the spool gun handle and constructed to deliver a consumable weld wire from the spool of wire to a tip of the spool gun assembly;

unitary means for connecting both the gas path to a gas system and the power cable to a power source to deliver welding-type power and shielding gas to the tip of the spool gun assembly; and

a multi-pin control connector connected to the unitary means and configured to provide feedback control signals between the spool gun assembly and the power source.

16. The spool gun assembly of claim 15 wherein the unitary connecting means further comprises a passage formed therein, the passage constructed to fluidly connect the gas system and the gas path of the spool gun handle.

17. The spool gun assembly of claim 15 further comprising a hub attached to the spool gun handle, the hub constructed to support a supply of consumable weld wire.

18. The spool gun assembly of claim 15 wherein the unitary connecting means is constructed of a conductive material and has an insulative cover positioned about a portion thereof.

19. A torch for welding-type systems comprising:
a spool gun constructed to receive a spool of consumable wire and connected to a gas supply hose and an electrical supply cable;
a single connector connectable to both a source of gas and a source of electrical power, the single connector connected to the gas supply hose and the electrical supply cable to deliver gas and electrical power to the spool gun; and

wherein the single connector has a closed end and an outer periphery, at least one groove formed in the outer periphery remote from the closed end and constructed to receive an O-ring therein.

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